MATH 323, Section 502

Linear Algebra

Fall 2022

Instructor: Yaroslav Vorobets
Time: TR 12:45 – 2:00 p.m.
Location: BLOC 163
Web page: `http://www.math.tamu.edu/~yvorobet/MATH323/`

Office: BLOC 301b (email: `yvorobets@tamu.edu`).

Office hours: TR 11:00 a.m. – 12:00 p.m. (in person), W 5:00 – 6:00 p.m. (via ZOOM), and by appointment.

Text: S. J. Leon, L. de Pillis, *Linear Algebra with Applications*, 10th ed., Pearson, 2020.

Prerequisites: MATH 148, 152, or 172 (Calculus II); MATH 300 (foundations of mathematics); junior or senior classification (or approval of instructor).

Grading system: There will be 2 in-class tests and the final comprehensive exam. The tests are worth 100 points (or 22.2% of the final grade) each, the final exam is worth 150 points (or 33.3% of the final grade). Extra credit can be earned by solving bonus problems (on tests and the final exam). The homework will account for another 100 points (or 22.2% of the final grade). The final grades will be assigned according to the 90–80–70–60% scale, that is, A for 405+ pts, B for 360–404 pts, C for 315–359 pts, D for 270–314 pts, and F for less than 270 pts.

The *tentative* dates for the two tests are October 6 and November 17. The final exam is scheduled for Wednesday, December 14, 8:00 – 10:00 a.m.

The (weekly) homework assignments should be submitted through Gradescope (via Canvas). Late submissions may be penalized if circumstances warrant.

Make-ups: Make-ups for missed quizzes and tests will only be allowed for a university approved excuse in writing. Wherever possible, inform the instructor before a test is missed. Consistent with University Student Rules, students are required to notify the instructor by the end of the next working day after missing a test. Otherwise, they forfeit their rights to a make-up.

Academic integrity: Although students are encouraged to discuss homework problems, each student is expected to write his/her own solutions. Copying another student's work is dishonest and academically worthless. For information on the Honor Council Rules and Procedures, visit `http://aggiehonor.tamu.edu/`

Copyright notice: All course materials (both printed and web-based) are protected by U.S. Copyright Laws. No multiple copies can be made without written permission by the instructor.

Students with disabilities: If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845–1637 (or visit `http://disability.tamu.edu`). Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Title IX and limits to confidentiality: Class materials are generally considered confidential pursuant to student record policies and laws. As a University employee, I, however, must report allegations of sexual assault, sexual discrimination, or sexual harassment when they involve TAMU students, faculty, or staff, or third parties visiting campus if you share such information with me.

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Course content: This is an introductory course in linear algebra covering the abstract concepts of vector space and linear transformation as well as some models and applications of these concepts to problems in the real world. Topics to be covered include: systems of linear equations, matrices, determinants, vector spaces, linear transformations, change of coordinates, orthogonality, eigenvalues and eigenvectors, diagonalization.

The emphasis of the course is both on problem solving and on abstract theory. The student should be able to rigorously prove some theorems.

Course outline

Part I ($\approx$ 3.5 weeks): *Elementary linear algebra*

- Systems of linear equations
- Gaussian elimination, Gauss-Jordan reduction
- Matrices, matrix algebra
- Determinants

Leon / de Pillis: Chapters 1–2

Part II ($\approx$ 4.5 weeks): *Abstract linear algebra*

- Vector spaces
- Linear independence
- Basis and dimension
- Coordinates, change of basis
- Linear transformations

Leon / de Pillis: Chapters 3–4

Part III ($\approx$ 4 weeks): *Advanced linear algebra*

- Eigenvalues and eigenvectors
- Diagonalization
- Orthogonality
- Inner products and norms
- The Gram-Schmidt orthogonalization process

Leon / de Pillis: Sections 5.1–5.6, 6.1, 6.3

Part IV ($\approx$ 2 weeks): *Topics in applied linear algebra*

- Matrix exponentials
- Rigid motions, rotations in space
- Orthogonal polynomials

Leon / de Pillis: Sections 5.7, 6.2, 6.4